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DIGIEC

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DIGITAL DC VOLTMETER

INSTRUCTION MANUAL
I-400A

SQ/CA 691

For Models

200A	210A	220A
202A	212A	222A
204A	214A	224A
400A	410A	414A

USC

UNITED SYSTEMS CORPORATION
918 WOODLEY ROAD / DAYTON 3, OHIO / 513-254-3567/FAX

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DIGIEC

SPECIFICATIONS

PRESENTATION	0.969		1.390	3.470
DIGITS - FULL SCALE	1000		2000	4000
D. C. VOLTAGE RANGES	0.000 - 1.000 V. 00.00 - 10.00 V 000.0 - 100.0 V. 0000. - 1000. V.	SINGLE RANGE 000.0 - 100.M.V.	0.000 - 2.000 V. 00.00 - 20.00 V. 000.0 - 200.0 V. 0000. - 1000. V.	0.000 - 4.000 V. 00.00 - 40.00 V. 000.0 - 400.0 V. 0000. - 1000. V.
ACCURACY (60°-115°F. AMB.) A. ZENER REF(1) B. MERCURY CELL	0.1% FULL SCALE 0.2% FULL SCALE	0.1% FULL SCALE (Available With Zener Ref. Only)	0.1% FULL SCALE (Available With Zener Ref. Only)	0.1% FULL SCALE (Available With Zener Ref. Only)
RESOLUTION	0.05% FULL SCALE	0.05% FULL SCALE	0.05% FULL SCALE	0.025% FULL SCALE
A. C. REJECTION	50 DB @ 60 CPS	40 DB @ 60 CPS	50 DB @ 60 CPS	50 DB @ 60 CPS
OVERLOAD PROTECTION	500V. ON 1V. RANGE 1250V. ALL OTHERS	100 VOLTS	500V. ON 2V. RANGE 1250V. ALL OTHERS	500V. ON 4V. RANGE 1250V. ALL OTHERS
MAX. BALANCE TIME	4 SEC. TO FULL SCALE		5 SEC. FULL SCALE	6 SEC. FULL SCALE
INPUT IMPEDANCE	2.2 MEG OHMS ALL RANGES (2)	ESSENTIALLY INFINITE AT BALANCE 100 K. Ω BEFORE BALANCE	2.2 MEG OHMS. ALL RANGES (2)	
DECIMAL POINT	ALL MODELS ILLUMINATED - SHIFTS WITH RANGE SWITCH			
OVER RANGE	ALL MODELS OFFER CALIBRATED 2% OVER RANGE ON ALL RANGES (Example: 1.000V. Range will read to "1.020V.")			
ISOLATION	ALL MODELS 500V.D.C. TO CASE & POWER LINE GROUND			
POWER REQUIREMENTS	ALL MODELS 100/125V. - 50/60C.P.S. - 28 WATTS			
MODEL	PORTABLE(3) 200 PANEL(4) 210 FLANGE(4) 220	Z - 400(1) Z - 410 Z - 420	Z - 202(1) Z - 212 Z - 222	Z - 204(1) Z - 214 Z - 224

NOTE: (1) PREFIX "Z" TO MODEL NO. FOR ZENER REF.
(2) EXCEPT 0.5 MEG OHMS (MIN:) BEFORE BALANCE ON LOWEST RANGE.
(3) SIZE: 5½" HIGH, 8" WIDE, 7" DEEP - WT. 7 LBS.
(4) SIZE & WEIGHT - SEE DWG.

UNITED SYSTEMS CORPORATION

918 WOODLEY ROAD / DAYTON 3, OHIO / (513) 254-3567 / FAX

DIGITEC Features

LOW COST Outstanding performance is provided in a low cost instrument providing digital readout.

ACCURACY Warranted accuracy is maintained for all internal contributing factors and the listed external conditions.

(1) Ambient Temperature—60° to 95° F.
(2) Power Source—100 to 125 V—50 to 60 CPS.

READING AMBIGUITY There is no ambiguity or reading (even for small changes) and no allowance need be made. Bi-directional voltage variations are followed without distracting backtracking. Input voltage drift can be continuously observed.

RESOLUTION AND REPEATABILITY The instrument can be easily read and is sensitive to small voltage changes. For short term observation, under stabilized ambient conditions, unit will repeat and is easily read to .05% or less. Thus, for many applications, the instrument can be used to a comparative accuracy of .05% full scale.

CALIBRATION EASE High input impedance permits direct calibration with an "Eppley" standard cell. Under normal usage, recalibration is required only at 6 month intervals.

RELIABILITY High reliability is achieved by a completely transistorized amplifier and the absence of stepping switches and relays. Normal overloads or incorrect polarity will not damage instrument.

READING SPEED Instrument comes to reading balance quickly and without annoying creep. Average reading time is approximately 2 seconds.

INPUT A 3-terminal color coded input group is furnished whereby choice is provided for grounded or floating input. A jumper link is furnished so that either negative or positive side of the input can be grounded.

DECIMAL POINT Decimal points are illuminated by a single, long-life easy-to-replace bulb. The decimal point shifts with range selector.

OTHER USES By use of compatible transducers, the DigiTec can be used to display readings of current, pressure, speed, position, flow, angle or any parameter. Current adaptors are available to provide readings of from .1 μA to 2 AMP. (See Bulletin CA-1.)

READING RETENTION A jack is located on the rear of the case to permit holding of a displayed voltage by means of an external switch. Suitable switches complete with cord and plug are available as optional accessories.

CARRYING HANDLE For the portable models, the convenient carrying handle also serves to set the viewing angle for optimum readability.

COLOR & TRIM The front nomenclature panel —all models—is etched aluminum on a black background. Series 200 and Model 400 have a light grey front cover and dark grey rear cover. All flange and panel styles are dark grey.

Certificate of Accuracy furnished with each instrument (traceable to NBS)

Optional Features

REFERENCE VOLTAGE Standard models include a carefully aged and calibrated mercury cell reference.

Zener circuit voltage reference can be furnished to achieve improved performance. The 100.0 MV and the 4000 digit models are furnished only with Zener reference.

AUXILIARY OUTPUT A potentiometer can be added to provide an analog output. This auxiliary pot can be linear with the input signal or non-linear to any specific relationship.

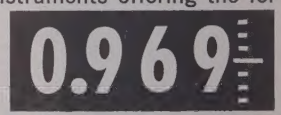
HIGH OR LOW TEMPERATURE MODELS The ambient temperature for which operation will be satisfactory is 60° to 95° F. For temperatures beyond these limits, special models are available.

Presentation

The motor driven digital indicator assembly can be readily varied to provide any reasonable number of readable digits. Standard models provide for readouts of "1000," "2000," or "4000" digits which can be scaled in from 4 to 6 seconds.

1000 DIGIT (Models 200, 210 or 220)
These are multi-range instruments offering the following four ranges:

0.000—1.000 Volts
00.00—10.00 Volts
000.0—100.0 Volts
0000.—1000. Volts



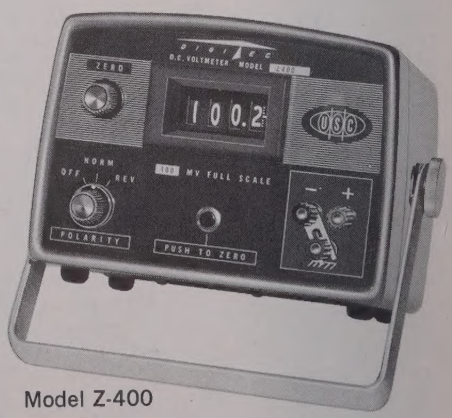
Typical Reading (0.9690)

An over-range of 2% is provided and the instrument can be accurately read to 1.020, 10.20, 102.0, or 1020. Volts.

The least significant digit (right hand number) is marked at .2 increments and permits readability beyond the 3 digits presented. (See illustration.)

1000 DIGIT LOW VOLTAGE—Single Range (Models Z-400, Z-410 or Z-420).

This model is offered only with Zener reference and reads from: 000.0 to 100.0 MV.



Model Z-400

An over-range of 2% is provided and the instrument can be accurately read to 102.0 MV.

OEM Models

DESIGN YOUR OWN DIGITAL READOUT FOR ANY PARAMETER USING THE DIGITEC INSTRUMENT AS A BASE.

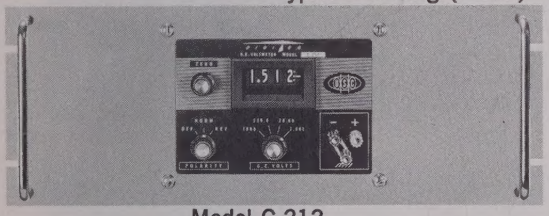
USC will furnish special models styled to meet your mounting or enclosure requirements. Stripped models can be furnished for complete integration into your product.

Operating controls can be omitted, integrated with your product or relocated to your requirements.

Digital presentation can be varied to furnish optimum functional readings.

2000 DIGIT (Models 202, 212 or 222)
These are multi-range instruments offering the following four ranges:
0.000—2.000 Volts
00.00—20.00 Volts
000.0—200.0 Volts
0000.—1000. Volts

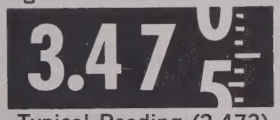
Typical Reading (1.397)


Model C-212

An over-range of 2% is provided and the instrument can be accurately read to 2.040, 20.40, 204.0 and 1020 Volts.

The right hand digits are presented, 0-2-4, etc., and graduated between digits. (See illustration.)

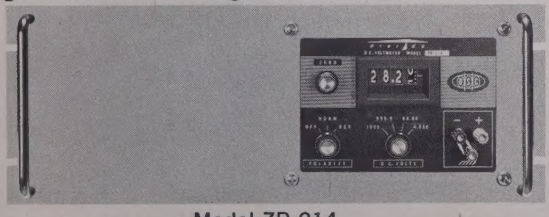
4000 DIGIT (Models Z-204, Z-214 or Z-224)
These are Zener reference multi-range instruments, offering the following 4 ranges:
0.000—4.000 Volts
00.00—40.00 Volts
000.0—400.0 Volts
0000.—1000. Volts



Typical Reading (3.473)

2% over-range is provided and the instrument can be accurately read to 4.080, 40.80, 408.0 and 1020 Volts.

The right hand digits are presented 0-5-0 and graduated between digits. (See illustration.)

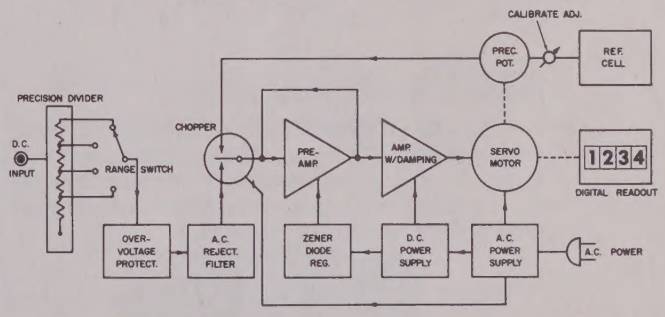

Model ZR-214

General Description

The DigiTec voltmeters are precision transistorized servo-balancing potentiometer type instruments capable of accurately indicating DC voltage digitally from 0.1 MV to 1000 V. Six basic enclosure styles are coupled with six internal variations to provide 36 standard models. This large variety of models makes it possible to select an instrument best suited for laboratory or production measurements with a high degree of accuracy and reliability.

Operation is simple, requiring only 3 front panel controls to provide all the necessary operational adjustments. Selecting "RANGE" properly positions the illuminated decimal point.

The operational description of the DigiTec is as follows: The voltage under measurement, after passing through the divider, protection circuit and filter, is fed to one side of the chopper comparator. The opposite side of the comparator is fed from the motor-driven precision potentiometer which derives its voltage from either: (a) temperature compensated Zener circuit, or (b) carefully aged and calibrated reference cell. The output of the chopper comparator provides an AC signal whose amplitude and phase is a function of the difference in magnitude and polarity of the DC voltages presented to the opposite side of the chopper input.



This AC signal then passes through a high impedance pre-amp to the power amplifier which incorporates a special damping feature. This damping effect makes possible extremely high slewing speeds with negligible overshoot and hunting at the null position.

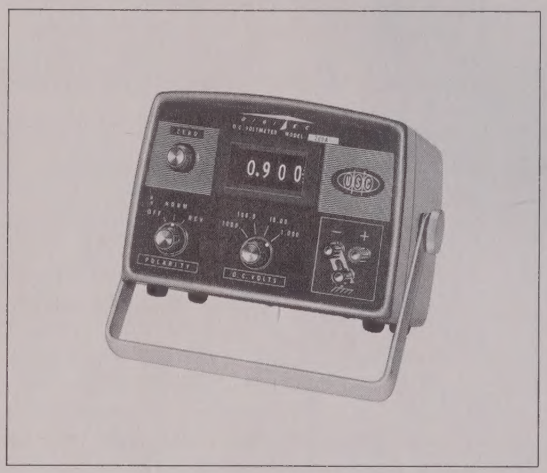
The servo-motor, upon receiving this amplified signal, drives the balancing potentiometer (and digital indicator) in the direction to cancel the difference voltage seen across the chopper comparator. When this voltage difference becomes zero, the voltage indicator will accurately present the voltage under measurement in digital form.

DIGITEC by USC

Enclosure Styles

PORTABLE
(Models 200, 202, Z-204, Z-400)

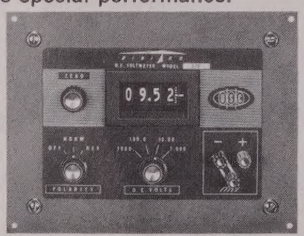
These models are provided with carrying handle and cord. Primarily intended for use on bench or table.



Model 200

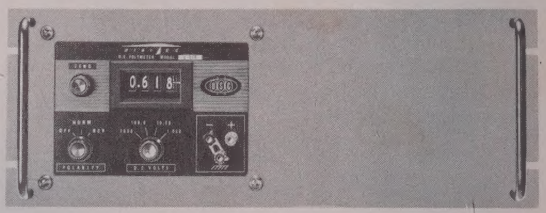
FLANGE
(Models 220, Z-420, 222 or Z-224)

For console or special equipment mounting. (See Dwg. 21601 for details.) These models are best suited for special installations. Numerous changes can be easily made to fit installation requirements or to provide special performance.

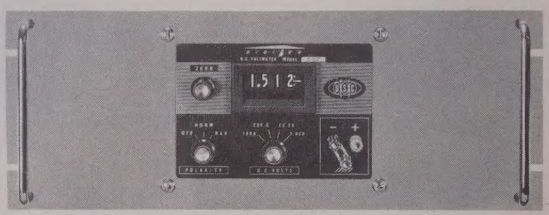


Model 220

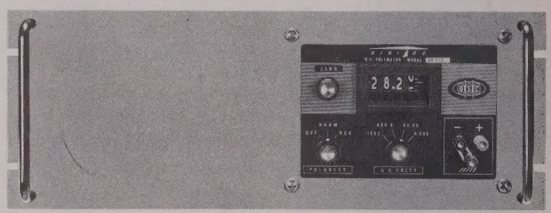
PANEL
(Models 210, Z-410, 212 or Z-214)



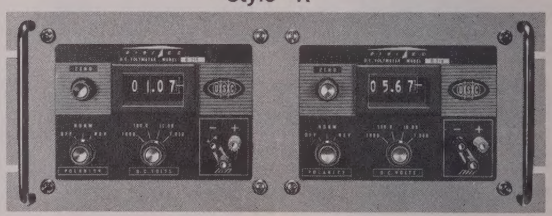
Style "L"



Style "C"



Style "R"



Style "D"

Offered in 4 styles, as shown, for Std. 19" rack or console mounting. The dual model is particularly convenient for simultaneous voltage and current readings. (See Dwg. 21301 for mounting details.)

Section II

OPERATION

A. GENERAL.

1. Immediately upon receipt, thoroughly inspect for any damage that may have occurred in transit. If any damage is noted, follow the instructions contained in the "Guarantee".

2. The DigiTec has been adjusted and calibrated at the factory prior to shipment. See Certificate enclosed. No further adjustments should be required for four (4) months. Complete instructions for recalibration are contained in this Manual.

B. PRECAUTIONS.

1. The instrument is furnished with either a:

   a. Three-wire line cord and polarized plug, or
   b. Three-pin polarized receptacle and mating plug.

   Connect instrument to 115V - 60 CPS power supply with "third wire" grounded. Since the instrument is high-impedance and capable of measuring low level signals, high reading accuracy will be maintained only if a good ground is used.

2. The perforated grills located on top and bottom of rear case allow for proper cooling. During operation these should not be obstructed. Operation in ambients in excess of 95° F may adversely affect accuracy and performance.

3. **Over-Voltage Protection.**

   DigiTec instruments provide voltage overload capabilities as listed on Specification Sheet, Page 5. No damage will occur if instrument is operated within the specified ratings. Opposite or "wrong" polarity applied to input within these ratings will not damage instrument.

4. **Isolated (Floating) Input.**

   A jumper-link is furnished on the front panel 3-terminal input group. Thus, choice is provided for grounded or isolated input. Generally, the following will apply:

   a. If the voltage under measurement has an indeterminate ground relationship, the link should be positioned to the isolated position, Fig. 1. This effectively isolates the DC circuit under measurement from case and power line ground. Isolation up to 500V DC is provided.

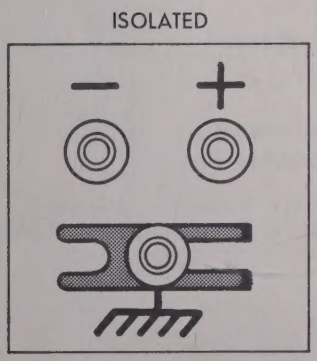


Fig. 1

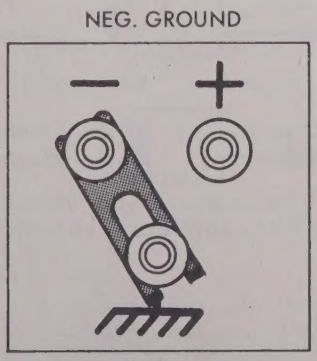


Fig. 2

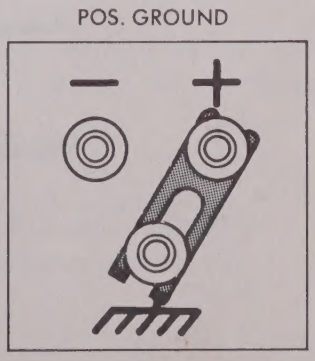


Fig. 3

B. PRECAUTIONS - Cont'd.

b. If the voltage under measurement has its negative side grounded, the link should be positioned to the black terminal, Fig. 2. Fig. 3 applies if the source voltage has its positive side grounded.

C. CONTROLS and TERMINALS.

1. There are only three operating controls, all mounted on the front panel of the instrument. These are:

   a. Combination line switch and polarity selector.

   b. Zero adjustment.

   c. Multi-Range instruments have a "Range Selector Switch".

   d. In place of the "Range Selector Switch" - Single Range instruments have a **"Zero Switch"** provided for convenience in **"Zeroing"** instrument. This switch does not short voltage under measurement.

2. All models have a 3-terminal input group located on the front panel. Flange and panel styles have an additional parallel 2-terminal input located on the real panel.

3. **Reading Retention Circuit.**

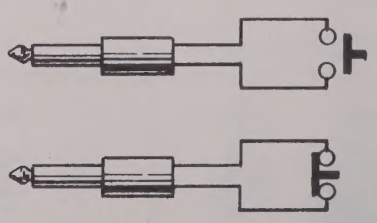
   A circuit is provided whereby the voltage display may be stored or retained for an indefinite period. The circuit providing this ability is made available by the "Reading Retention Jack" on the case rear. The following are possible when the retention circuit is used:

   a. Indefinitely "store" a voltage sampled at a given time.

   b. Quickly display voltages measured in close proximity of each other without instrument cycling (i.e., returning to zero between readings). This is important for production type testing.

   c. Denote a change or drift in voltage over any time interval.

   The retention circuit is brought out to a standard closed circuit phone jack. When a standard **"2-circuit phone plug"** is inserted in the jack, the reading will be retained. When a switch wired across the plug is closed, the instrument will operate normally. The following diagram shows the arrangements possible.



Push to read
(Normally open switch)

Push to hold reading
(Normally closed switch)

Switches shown may be foot-operated, push button, etc., with momentary or positive action, as desired.

D. OPERATING PROCEDURE.

1. Turn instrument on. Readings may be taken immediately, however, for optimum accuracy, a 15 minute warm-up is desirable.

2. Zero out instrument by shorting input terminals and setting Zero adjustment so that display reads exactly "0000".

   Note: Single Range instruments (which offer infinite input impedance) may display readings other than zero with input terminals open. (This is a normal condition.) Instrument will operate properly when connected to the source of voltage under measurement.

3. For Multi-Range instruments set Range Selector to the desired range. If voltage is unknown, set to highest range and downrange as required. Indication of "Full Scale Limit" for any range is evidenced by reading in excess of "1020" on "1000" digit instruments and "2040" and "4080" respectively for "2000" and "4000" digit instruments.

4. With Polarity Selector Switch set to "Normal", the "Positive" side of the voltage under measurement should be connected to the Red (+) terminal. The "Negative" side to the Black (–) terminal.
5. A reading of "9999" (or below) indicates that the meter has driven to its "Reverse" stop. The input leads may be reversed or the Polarity Switch may be positioned to "Reverse".

   Caution: If the grounding link is in either Fig. 2 or Fig. 3 position, reversing leads will change the ground relationship of voltage being measured.

6. For greatest accuracy, the instrument should be "Zeroed" when ranges or polarity are changed.

E. SENSITIVITY ADJUSTMENT.

Sensitivity is adjusted by a trimmer potentiometer, accessible through the rear case or plate. (See Fig. 4). Turning "CW" increases sensitivity, "CCW" decreases sensitivity.

Caution: Resolution and accuracy may be impaired if sensitivity is set too low.

Section III

CALIBRATION

A. GENERAL PROCEDURE AND PRECAUTIONS.

1. The DC voltage supply used for calibration should be stable and accurate to at least .01% for "Z" models* and .02% for others.
2. For maximum accuracy, calibration should be accomplished in a draft free area at 70° to 80°F.
3. **DO NOT** remove instrument from case.
4. Use a non-metallic screwdriver for all adjustments.
5. Connect instrument to 110 to 115V - 60 CPS power supply with third pin connected to ground.
6. Turn instrument on and allow to warm up for at least 30 minutes prior to calibration.
7. All calibration adjustment pots are locked at the factory against inadvertent movement with a drop of Glyptol. There will be a slight resistance to motion until this spot is broken.

B. REFERENCE VOLTAGE ADJUSTMENT. (Approximately every 4 months)

1. Remove hole plug exposing "Reference Voltage Adjustment", accessible through rear case or rear panel. (See Fig. 4)
2. For multi-range instruments, set Range Switch to lowest voltage.
3. Carefully Zero instrument with input terminals shorted.
4. Apply accurately known "Standard" voltage to input terminals of proper value to produce full scale reading.
5. Turn "Reference Voltage Adjustment" as required until "Standard" reading is observed. (See Fig. 4)
6. Para. B-1 thru B-5 completes the calibration adjustment for a single-range unit. For a multi-range unit this completes the calibration of the lowest range and also sets the span for all additional ranges.
7. If a meter with mercury cell reference cannot be calibrated properly (meter reads high and cannot be lowered to "Standard" voltage), replace mercury cell. (See Page 11)

C. DIVIDER ADJUSTMENT - MULTI-RANGE INSTRUMENTS. (Approx. every 8 months)

1. Precede with "Reference Voltage Adjustment".
2. For portable style instruments, remove 3-hole plugs in bottom of case. (See Fig. 5)
3. For panel and flange style instruments, remove bottom screen exposing adjustment pots.
4. Lowest (or base) range has already been set. Set Range Switch to next highest range. Carefully Zero instrument with input terminals shorted.

*__NOTE:__ Model No's Prefixed with "Z" have Zener Reference.

C. DIVIDER ADJUSTMENT - MULTI-RANGE INSTRUMENTS - Cont'd.

5. Apply accurately known voltage to input terminals of proper value to produce full scale reading.

6. Reset adjustment as required (corresponding to range being calibrated) so that instrument indicates applied voltage. (See Fig. 5)

7. Repeat with remaining ranges. Divider adjustments are **not** inter-acting. Any range may be reset without disturbing the others.

D. FACTORY RECALIBRATION.

USC offers complete and prompt recalibration service at nominal charge. This includes replacement of "Reference Cell". The recalibration will be conducted with .01% standards traceable to N.B.S. A Certificate will be issued with the recalibrated unit.

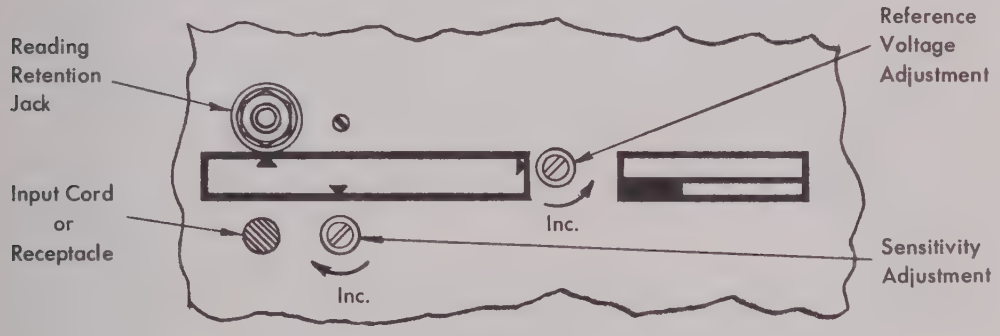


Fig. 4
REAR VIEW

Divider Adjustments		
10V	100V	1000V
20V	200V	1000V
40V	400V	1000V

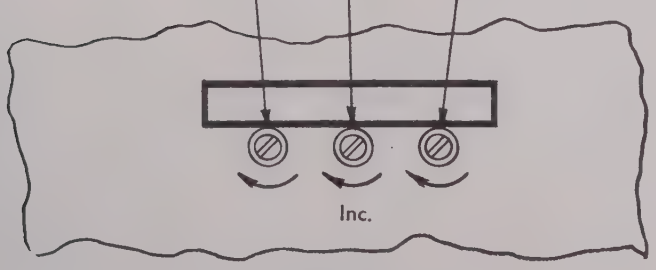


Fig. 5
BOTTOM VIEW

Section IV

MAINTENANCE

A. REAR CASE REMOVAL.

1. **Portable Style.**

   The case front is fastened to the rear case by one small screw on each side. Remove both screws and slide assembly out of rear case. This will expose entire internal assembly.

2. **Panel and Flange Style.**

   All normal maintenance can be accomplished be removing rear panel which is held in place by four screws. The side panels and grills can also be removed to provide additional accessibility.

B. LAMP REPLACEMENT.

1. Illumination of numerals and decimal points is provided by a single lamp. Loosen screw holding lamp socket, and swing up. Replace lamp and reposition socket so that it clears counter frame by approximately 1/8".

C. FUSE REPLACEMENT.

1. The 1.0 amp. fuse may fail as a result of severe line transients, or by component failure within the instrument. If the replacement fuse fails, the circuit should be checked thoroughly. **A higher current fuse should never be substituted.** Fuse is located on rear of component board adjacent to transformer.

D. REFERENCE CELL REPLACEMENT. (Not applicable to models with "Z" prefix)

1. **Preliminary.**

   As the Mercury Reference Cell (s) ages, the DigiTec reading will be **HIGH** as compared to a "Standard" voltage applied. If the mercury cell (s) is still satisfactory it will be possible to turn the Reference Voltage Adjustment and bring the reading below the "Standard" voltage applied.

   Mercury Reference Cell (s) should be replaced if any one of the following conditions exists:

   a. Two years past date stamped on cell.
   b. The output voltage of the cell is less than 1.33 volts.
   c. With the "Reference Voltage Adjustment" turned completely clockwise, the DigiTec reading is less than .001 volts below the "Standard" input voltage. (.002 volts for "2000 digit" instrument.)

2. **Replacement Procedure.** (See Figs. 6 & 7)

   a. Unsolder old cell (s) and remove.
   b. Use cell (s) USC Stock No. 200-021.
      Note: These are Mallory P/N 30334 cells, specially "aged" and calibrated by USC. Do not install after one (1) year beyond date stamped on cell.
   c. Straighten tabs of reference cell and note "+" marks. (See Fig. 6)
   d. Insert cell in holder.
   e. Bend cell tabs so as to clear holder frame and to fit outside holder tabs. Cut to length. Tin cell tabs and solder to holder tabs. (See Fig. 7)
      Note: Cell tab must clear holder frame to avoid shorting. If cell is momentarily shorted in handling or installation, 24 hours should be allowed before recalibration is started.

Instructions
"B" MODEL DIGITECS*

Supplementing I-400A

The data and instructions in I-400A apply except as noted below:

A. SPECIFICATIONS (Sec. I).

1. Operating ambient is increased to 115°F.
2. Models for 200/240 V-AC line voltage have been added and are designated by prefix "1" –, such as, "1200", "1210", "1220", etc.

B. REAR CASE REMOVAL - ALL MODELS (Sec. IV A).

1. The rear case is fastened to the front case (or panel) by two knurled captive screws projecting from the rear. Loosen these two screws and slide rear case off of the assembly.

C. LAMP REPLACEMENT (Sec. IV B).

1. Lamp (L1) used is 1458.

D. FUSE REPLACEMENT (Sec. IV C).

1. Fuse (F1) is located on rear case and is externally replaceable. Fuse used is "Bussman" AGC-1 amp.

E. REFERENCE CELL REPLACEMENT (Sec. IV D2).

1. Reference Cell Holder and method of soldering tabs have been changed. Holder cannot short cell and tabs are now wrapped around post terminals and then soldered.

F. MODEL 1200B.

1. Models 1200B, 1210B, 1220B, etc. are for use when connected to 220 V-50 CPS power supply. All other instructions and data are unchanged.

G. WIRING DIAGRAM & PARTS LISTS (Sec. IV G).

1. Use attached Wiring Diagrams and Parts Lists, noted for use with Suffix "B" voltmeters.

*The "B" Model DigiTecs can be distinguished from the "A" Models by the case color which is a dark blue as compared to dark grey.

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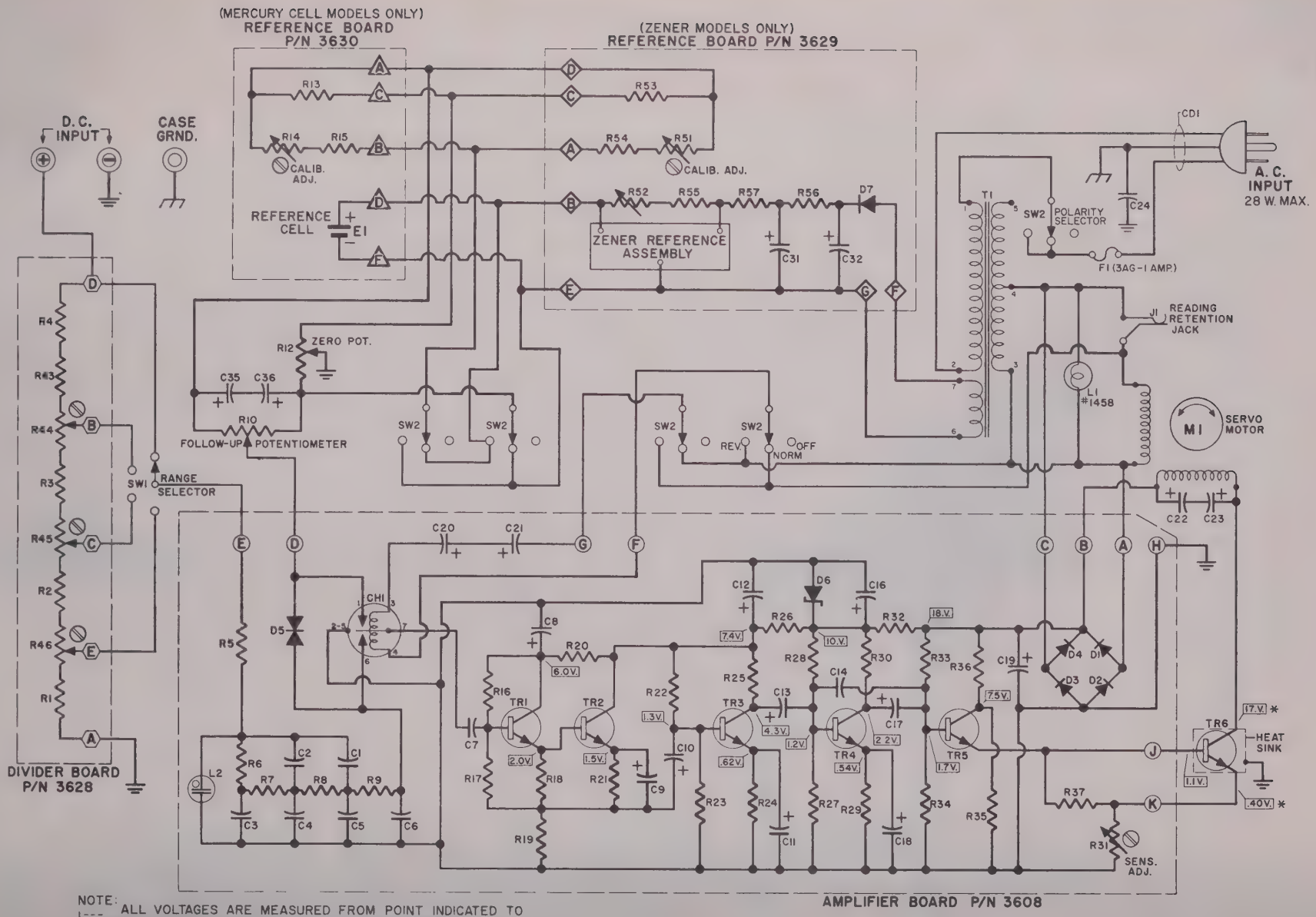

NOTE:
1.--- ALL VOLTAGES ARE MEASURED FROM POINT INDICATED TO SIGNAL GROUND USING A 20KΩ/V D.C. INSTRUMENT.
2.--- MEASUREMENTS ARE TAKEN WITH NO SIGNAL INPUT AND SWITCHES POSITIONED AS SHOWN.
*--AVERAGE READINGS-THESE VOLTAGES ARE DEPENDENT ON SETTING OF R31.
⏚ SIGNAL GROUND
⏚ CASE GROUND

WIRING DIAGRAM

APPLICABLE TO MULTI-RANGE VOLTMETERS WITH SUFFIX "B" MODEL NO.

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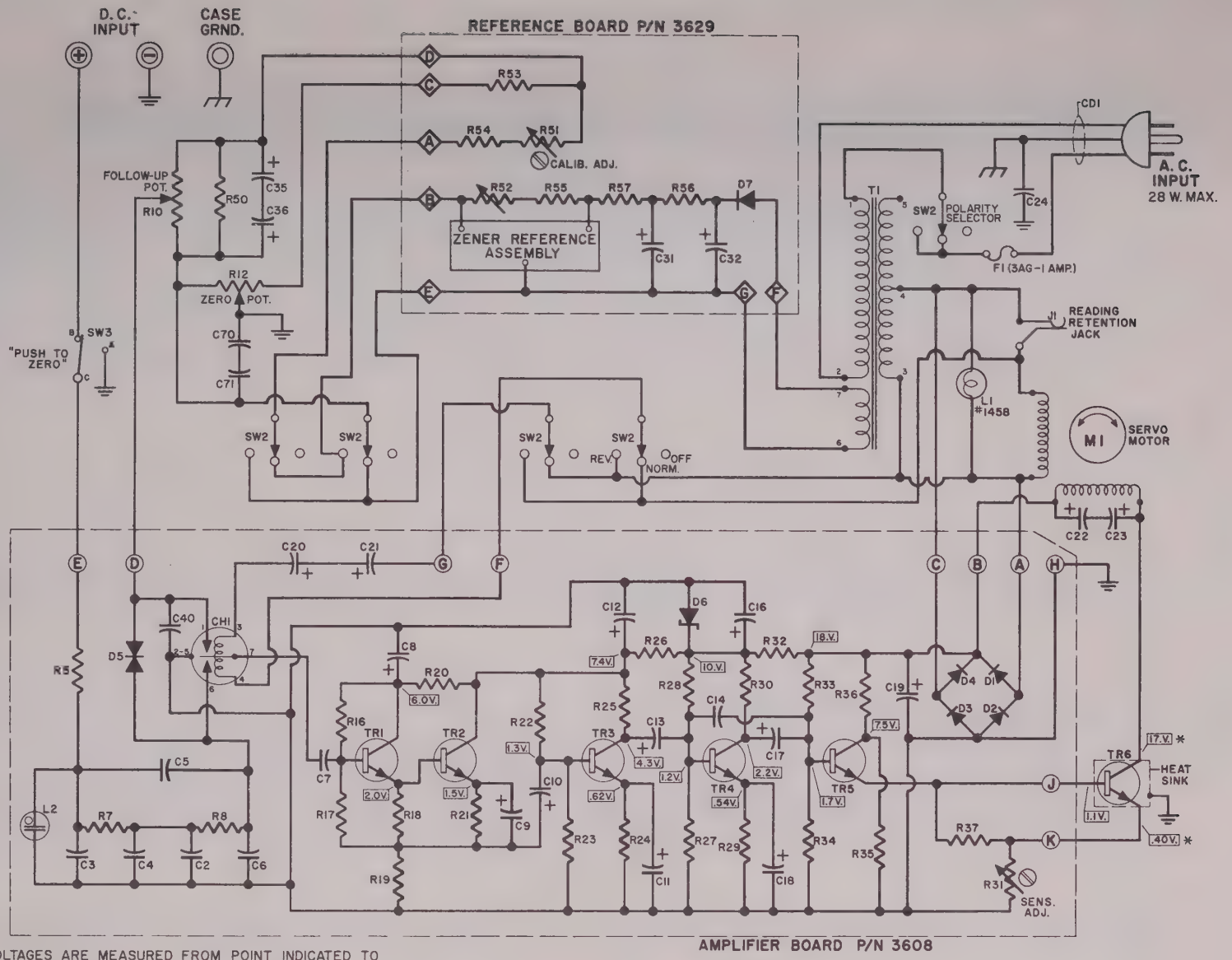
DAYTON, OHIO



NOTE:
1--- ALL VOLTAGES ARE MEASURED FROM POINT INDICATED TO SIGNAL GROUND USING A 20K Ω/V D.C. INSTRUMENT.
2--- MEASUREMENTS ARE TAKEN WITH INPUT SHORTED AND SWITCHES POSITIONED AS SHOWN.
*--AVERAGE READINGS-THESE VOLTAGES ARE DEPENDENT ON SETTING OF R31.
⏚ SIGNAL GROUND
⏚ CASE GROUND

WIRING DIAGRAM

APPLICABLE TO SERIES #400 VOLTMETERS WITH SUFFIX "B"

UNITED SYSTEMS CORP.
DAYTON, OHIO

PARTS LIST FOR MODELS WITH "B" SUFFIX

SYMBOL	DESCRIPTION	STOCK NO.
C1, 2	Capacitor .0015 mfd @ 600 V (Except Series 400)	200-006
C2	Capacitor .05 mfd @ 50 V (Series 400 only)	200-007
C3, 4, 7	Capacitor .05 mfd @ 50 V	200-007
C5, 6, 14	Capacitor .05 mfd @ 50 V (Except Series 400)	200-007
C5, 14	Capacitor .02 mfd @ 50 V (Series 400 only)	200-008
C6	Capacitor 1.0 mfd @ 200 V (Series 400 only)	200-079
C8, 12, 16, 13, 17, 35, 36	Capacitor 25 mfd @ 25 V	200-009
C9, 11, 18	Capacitor 100 mfd @ 3 V	200-010
C10, 20, 21	Capacitor 10 mfd @ 25 V	200-011
C19	Capacitor 100 mfd @ 25 V	200-012
C22, 23	Capacitor 50 mfd @ 25 V	200-013
C24	Capacitor .05 mfd @ 600 V	200-014
C31, 32	Capacitor 25 mfd @ 50 V (Zener models only)	200-078
C40	Capacitor .22 mfd @ 200 V	200-102
C70, 71	Capacitor 500 mfd @ 3 V	200-101
CD1	Cord, 3 Wire Power w/Strain Relief Bushing (Portable Models)	200-015
CD1	Polarized "Twist-Lock" Receptacle (Male) (Panel and Flange Models)	200-016
CH1	Chopper	200-017
D1, 2, 3, 4	Diode, IN 2069	200-018
D5	Varistor V-49	200-019
D6	Zener Diode, IN714	200-020
E1	Reference Cell	200-021
F1	Fuse, Bussman AGC 1.0 Amp. 250 V	200-103
J1	Jack, Reading Retention	200-023
L1	Lamp, #1458	200-104
L2	Lamp, NE-2H	200-025
R1	Resistor 2210 ohm 1/2 W 1% (Except Series 400)	200-028
R2	Resistor 20K ohm 1/2 W 1% (Except Series 400)	200-029
R3	Resistor 200K ohm 1/2 W 1% (Except Series 400)	200-030
R4	Resistor 1 Meg ohm 1/2 W 1% (Except Series 400)	200-031
R5	Resistor 180K ohm 1 W 5% (Except Series 400)	200-032
R5	Resistor 68K ohm 1/2 W 5% (Series 400 only)	200-052
R6, 7, 8, 9	Resistor 120K ohm 1/2 W 5% (Except Series 400)	200-033
R7	Resistor 47K ohm 1/2 W 5% (Series 400 only)	200-092
R8	Resistor 33K ohm 1/2 W 5% (Series 400 only)	200-041
R10	Balancing Potentiometer (Except Zener models)	200-105
R10	Balancing Potentiometer (Zener model only)	200-106
R12	Potentiometer 200 ohm 1W (Zero adj.)	200-036
R13	Resistor 10K ohm 1/2 W 1% (Mercury models only)	200-037
R14	Potentiometer 300 ohm 2 W 5% (Mercury models only)	200-082
R15	Resistor 2370 ohm 1/2 W 1% (Mercury models only)	200-085
R16	Resistor 470K ohm 1/2 W 5%	200-040
R17	Resistor 240K ohm 1/2 W 5%	200-107
R18, 20, 33	Resistor 33K ohm 1/2 W 5%	200-041
R19, 27	Resistor 12K ohm 1/2 W 5%	200-042
R21	Resistor 22K ohm 1/2 W 5%	200-043
R23	Resistor 10K ohm 1/2 W 5%	200-046
R24, 32	Resistor 1K ohm 1/2 W 5%	200-047
R25	Resistor 4.7K ohm 1/2 W 5%	200-048
R26, 30	Resistor 3.3K ohm 1/2 W 5%	200-049
R28	Resistor 82K ohm 1/2 W 5%	200-108
R29	Resistor 220K ohm 1/2 W 5%	200-050
R31	Potentiometer 5 ohm 2 W 5% (Sensitivity Adj.)	200-109
R34	Resistor 3.9K ohm 2 W 5%	200-053
R35, 36	Resistor 220 ohm 1 W 5%	200-054
R37	Resistor 68 ohm 1/2 W 5%	200-055
R43	Resistor 1.02 Megohm 1/2 W 1% (Except 400 Series)	200-056
R44	Potentiometer 5K ohm 2 W 5% (Except 400 Series)	200-113
R45	Potentiometer 500 ohm 2 W 5% (Except 400 Series)	200-114
R46	Potentiometer 50 ohm 2 W 5% (Except 400 Series)	200-115
R50	Resistor 440 ohm 3 W 1% (Series 400 only)	200-089
R51	Potentiometer 1500 ohm 1 W 5% (Series Z-200 & 400)	200-110
R51	Potentiometer 800 ohm 1 W 5% (Series Z-202)	200-111
R51	Potentiometer 500 ohm 1 W 5% (Series Z-204)	200-112
R52	Potentiometer 150 ohm 1 W 5% (Zener models only)	200-038
R53	Resistor 4.7K ohm 3 W 1% (Zener models only)	200-080
R54	Resistor 35K ohm 3 W 1% (Series Z-200 & 400)	200-086
R54	Resistor 15.3K ohm 3 W 1% (Series Z-202)	200-087
R54	Resistor 5.3K ohm 3 W 1% (Series Z-204)	200-088
R55	Resistor 390 ohm 1 W 10% (Zener models only)	200-090
R56, 57	Resistor 560 ohm 1 W 10% (Zener models only)	200-091
SW1	Switch Range Selector (Multi-range models)	200-116
SW2	Switch Polarity-Off-On	200-061
SW3	Switch Push to Zero (Series 400 only)	200-073
T1	Transformer, Power (115 V only)	200-063
T1	Transformer, Power (220 V only)	200-117
TR1, 2	Transistor, Silicon 2N2924	200-118
TR3, 4	Transistor, Silicon 2N2924 (Series 200 & 202)	200-118
TR3, 4	Transistor, Silicon 2N2923 (Series 204)	200-119
TR3, 4, 5	Transistor, Silicon 2N2925 (Series 400)	200-120
TR5	Transistor, Silicon 2N2924 (Series 400 only)	200-118
TR6	Transistor, Silicon 2N1488	200-121
Z	Zener Reference Assy.	200-126

MISCELLANEOUS

Ground Link	200-066
Handle	200-067
Knob, Handle Retaining w/Friction Washer	200-068
Knob, Polarity	200-069
Knob, Range	200-069
Knob, Zero	200-070
Lens, Magnifier	200-071
Rubber Feet	200-127
Terminal, Black input	200-002
Terminal, Red input	200-004
Terminal, Green input	200-005

READOUT ASSEMBLY

(Pre-wired) including motor-counter, potentiometer, gears and mask.

Series "200"	200-122
Series "202"	200-123
Series "204"	200-124
Series "400"	200-125

PARTS LIST FOR MODELS WITH "B" SUFFIX

SYMBOL	DESCRIPTION	STOCK NO.
C1, 2	Capacitor .0015 mfd @ 600 V (Except Series 400)	200-006
C2	Capacitor .05 mfd @ 50 V (Series 400 only)	200-007
C3, 4, 7	Capacitor .05 mfd @ 50 V	200-007
C5, 6, 14	Capacitor .05 mfd @ 50 V (Except Series 400)	200-007
C5, 14	Capacitor .02 mfd @ 50 V (Series 400 only)	200-008
C6	Capacitor 1.0 mfd @ 200 V (Series 400 only)	200-079
C8, 12, 16, 13, 17, 35, 36	Capacitor 25 mfd @ 25 V	200-009
C9, 11, 18	Capacitor 100 mfd @ 3 V	200-010
C10, 20, 21	Capacitor 10 mfd @ 25 V	200-011
C19	Capacitor 100 mfd @ 25 V	200-012
C22, 23	Capacitor 50 mfd @ 25 V	200-013
C24	Capacitor .05 mfd @ 600 V	200-014
C31, 32	Capacitor 25 mfd @ 50 V (Zener models only)	200-078
C40	Capacitor .22 mfd @ 200 V	200-102
C70, 71	Capacitor 500 mfd @ 3 V	200-101
CD1	Cord, 3 Wire Power w/Strain Relief Bushing (Portable Models)	200-015
CD1	Polarized "Twist-Lock" Receptacle (Male) (Panel and Flange Models)	200-016
CH1	Chopper	200-017
D1, 2, 3, 4	Diode, IN 2069	200-018
D5	Varistor V-49	200-019
D6	Zener Diode, IN714	200-020
E1	Reference Cell	200-021
F1	Fuse, Bussman AGC 1.0 Amp. 250 V	200-103
J1	Jack, Reading Retention	200-023
L1	Lamp, #1458	200-104
L2	Lamp, NE-2H	200-025
R1	Resistor 2210 ohm 1/2 W 1% (Except Series 400)	200-028
R2	Resistor 20K ohm 1/2 W 1% (Except Series 400)	200-029
R3	Resistor 200K ohm 1/2 W 1% (Except Series 400)	200-030
R4	Resistor 1 Meg ohm 1/2 W 1% (Except Series 400)	200-031
R5	Resistor 180K ohm 1 W 5% (Except Series 400)	200-032
R5	Resistor 68K ohm 1/2 W 5% (Series 400 only)	200-052
R6, 7, 8, 9	Resistor 120K ohm 1/2 W 5% (Except Series 400)	200-033
R7	Resistor 47K ohm 1/2 W 5% (Series 400 only)	200-092
R8	Resistor 33K ohm 1/2 W 5% (Series 400 only)	200-041
R10	Balancing Potentiometer (Except Zener models)	200-105
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R15	Resistor 2370 ohm 1/2 W 1% (Mercury models only)	200-085
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R18, 20, 33	Resistor 33K ohm 1/2 W 5%	200-041
R19, 27	Resistor 12K ohm 1/2 W 5%	200-042
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R28	Resistor 82K ohm 1/2 W 5%	200-108
R29	Resistor 220K ohm 1/2 W 5%	200-050
R31	Potentiometer 5 ohm 2 W 5% (Sensitivity Adj.)	200-109
R34	Resistor 3.9K ohm 2 W 5%	200-053
R35, 36	Resistor 220 ohm 1 W 5%	200-054
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R46	Potentiometer 50 ohm 2 W 5% (Except 400 Series)	200-115
R50	Resistor 440 ohm 3 W 1% (Series 400 only)	200-089
R51	Potentiometer 1500 ohm 1 W 5% (Series Z-200 & 400)	200-110
R51	Potentiometer 800 ohm 1 W 5% (Series Z-202)	200-111
R51	Potentiometer 500 ohm 1 W 5% (Series Z-204)	200-112
R52	Potentiometer 150 ohm 1 W 5% (Zener models only)	200-038
R53	Resistor 4.7K ohm 3 W 1% (Zener models only)	200-080
R54	Resistor 35K ohm 3 W 1% (Series Z-200 & 400)	200-086
R54	Resistor 15.3K ohm 3 W 1% (Series Z-202)	200-087
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R55	Resistor 390 ohm 1 W 10% (Zener models only)	200-090
R56, 57	Resistor 560 ohm 1 W 10% (Zener models only)	200-091
SW1	Switch Range Selector (Multi-range models)	200-116
SW2	Switch Polarity-Off-On	200-061
SW3	Switch Push to Zero (Series 400 only)	200-073
T1	Transformer, Power (115 V only)	200-063
T1	Transformer, Power (220 V only)	200-117
TR1, 2	Transistor, Silicon 2N2924	200-118
TR3, 4	Transistor, Silicon 2N2924 (Series 200 & 202)	200-118
TR3, 4	Transistor, Silicon 2N2923 (Series 204)	200-119
TR3, 4, 5	Transistor, Silicon 2N2925 (Series 400)	200-120
TR5	Transistor, Silicon 2N2924 (Series 400 only)	200-118
TR6	Transistor, Silicon 2N1488	200-121
Z	Zener Reference Assy.	200-126

MISCELLANEOUS

Ground Link	200-066
Handle	200-067
Knob, Handle Retaining w/Friction Washer	200-068
Knob, Polarity	200-069
Knob, Range	200-069
Knob, Zero	200-070
Lens, Magnifier	200-071
Rubber Feet	200-127
Terminal, Black input	200-002
Terminal, Red input	200-004
Terminal, Green input	200-005

READOUT ASSEMBLY

(Pre-wired) including motor-counter, potentiometer, gears and mask.

Series "200"	200-122
Series "202"	200-123
Series "204"	200-124
Series "400"	200-125

Instructions
"B" MODEL DIGITECS*

Supplementing I-400A

The data and instructions in I-400A apply except as noted below:

A. SPECIFICATIONS (Sec. I).

1. Operating ambient is increased to 115°F.
2. Models for 200/240 V-AC line voltage have been added and are designated by prefix "1" –, such as, "1200", "1210", "1220", etc.

B. REAR CASE REMOVAL - ALL MODELS (Sec. IV A).

1. The rear case is fastened to the front case (or panel) by two knurled captive screws projecting from the rear. Loosen these two screws and slide rear case off of the assembly.

C. LAMP REPLACEMENT (Sec. IV B).

1. Lamp (L1) used is 1458.

D. FUSE REPLACEMENT (Sec. IV C).

1. Fuse (F1) is located on rear case and is externally replaceable. Fuse used is "Bussman" AGC-1 amp.

E. REFERENCE CELL REPLACEMENT (Sec. IV D2).

1. Reference Cell Holder and method of soldering tabs have been changed. Holder cannot short cell and tabs are now wrapped around post terminals and then soldered.

F. MODEL 1200B.

1. Models 1200B, 1210B, 1220B, etc. are for use when connected to 220 V-50 CPS power supply. All other instructions and data are unchanged.

G. WIRING DIAGRAM & PARTS LISTS (Sec. IV G).

1. Use attached Wiring Diagrams and Parts Lists, noted for use with Suffix "B" voltmeters.

*The "B" Model DigiTecs can be distinguished from the "A" Models by the case color which is a dark blue as compared to dark grey.

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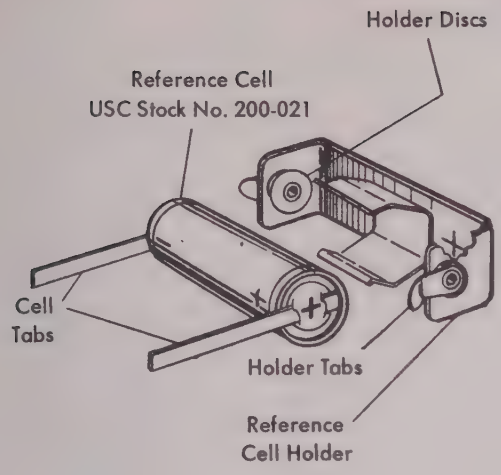


Fig. 6

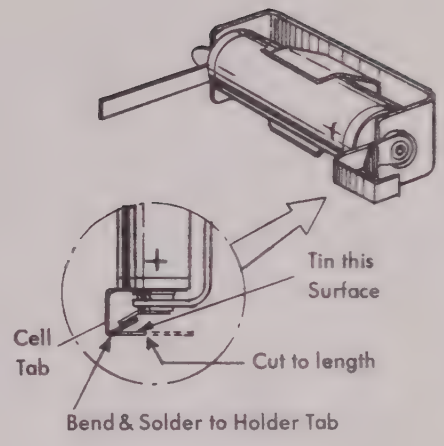


Fig. 7

E. LUBRICATION.

NO lubrication is required by the mechanical components used in the instrument. Oil or grease applied may only serve to accumulate dirt and impair operation.

F. CLEANING.

1. To clean display wheels: Loosen screw holding lamp socket and swing up. Use damp cotton swab followed by dry swab to clean characters. (**Never use solvents or abrasives**)

2. To clean magnifying lens: Use only soft clean cloth or swab (slightly dampened) followed by dry to clean lens surface. Lens is a plastic material and will be damaged by abrasives or solvents.

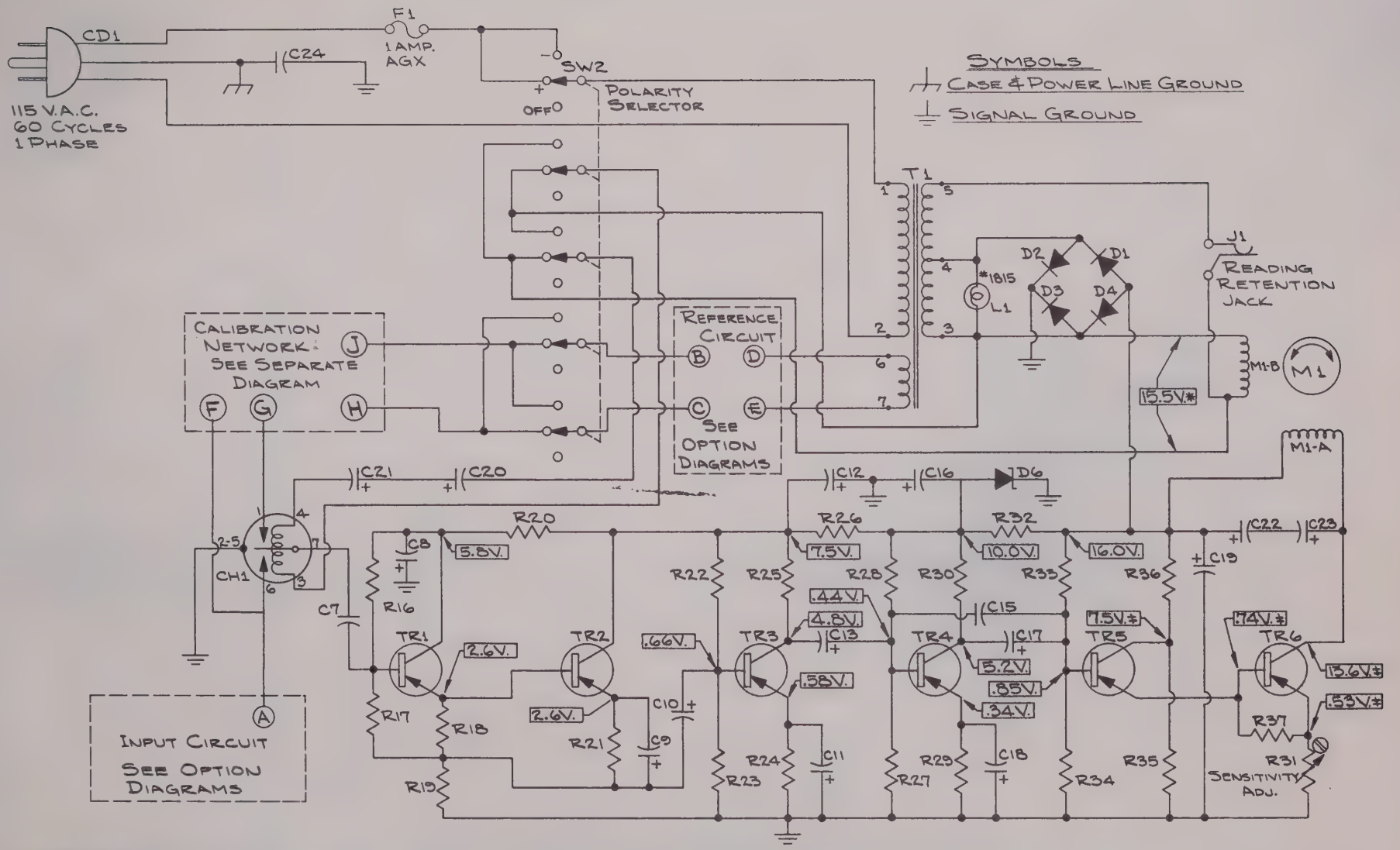
G. COMPONENT REPLACEMENT OR REPAIR.

1. Carefully check applicable Schematic Wiring Diagrams, (pages 14 & 15) before making any repairs. When replacement parts are procured from USC, the following data must be furnished.

   a. Model and Serial Number.

   b. Part Stock Number (See Parts List).

2. USC offers complete and prompt repair at nominal charge.



NOTES:

(*)1. ALL VOLTAGES ARE MEASURED WITH A D.C. V.T.V.M. FROM POINT INDICATED TO SIGNAL GROUND EXCEPT READING MARKED (*) WHICH IS MEASURED BETWEEN POINTS INDICATED WITH AN A.C. V.T.V.M.

2. MEASUREMENTS ARE TAKEN WITH NO SIGNAL INPUT & SWITCHES POSITIONED AS SHOWN.

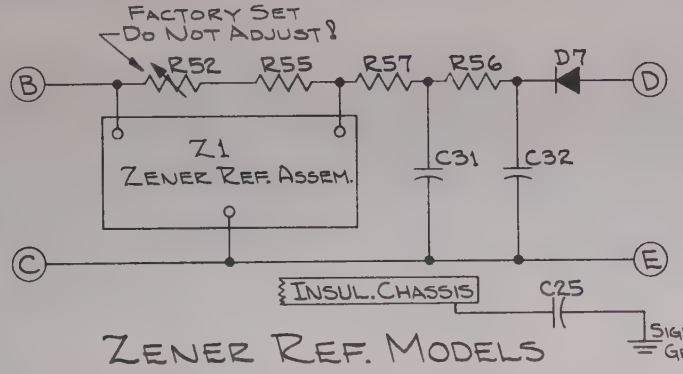
(*)3. READINGS MARKED (*) MAY VARY DEPENDENT ON POT. (R31) SETTING.

4. ALL READINGS SHOULD AGREE WITH VALUES SHOWN WITHIN ±20%.

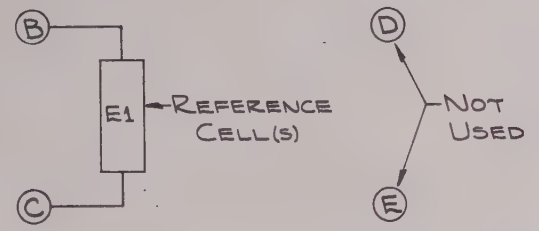
UNITED SYSTEMS CORP.
DAYTON, OHIO

WIRING DIAGRAM
DIGITAL VOLTMETER

Reference Circuit Options

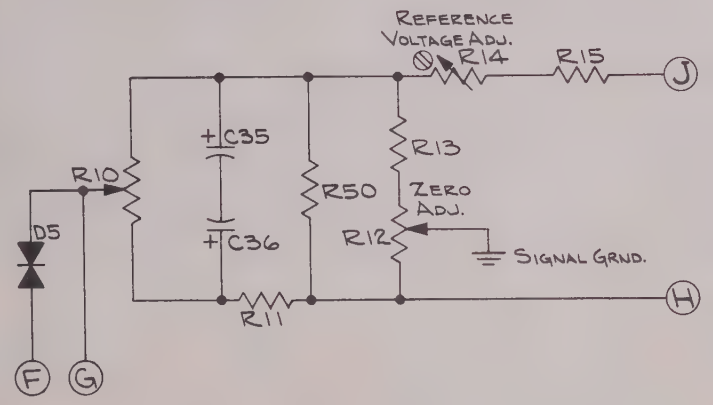


Zener Ref. Models

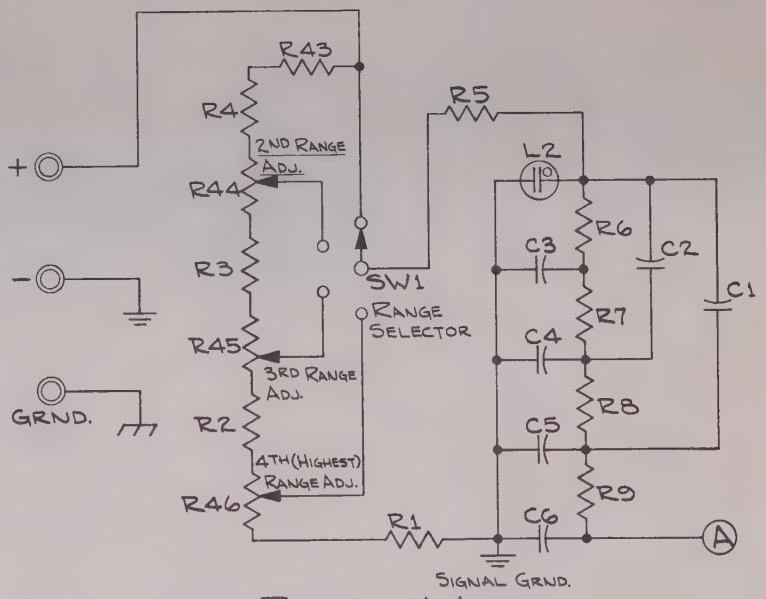


Mercury Cell Ref. Models

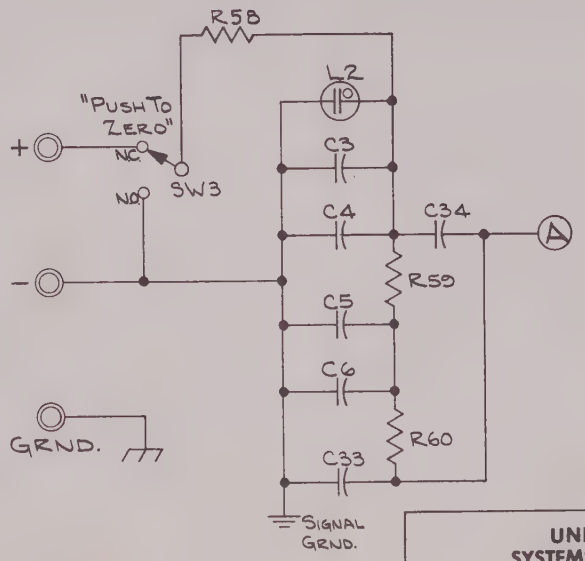
Calibration Network



Input Circuit Options



Multi Range Models



Single Range Models

UNITED SYSTEMS CORP.
DAYTON, OHIO

Wiring Diagram
Digital Voltmeter

PARTS LIST

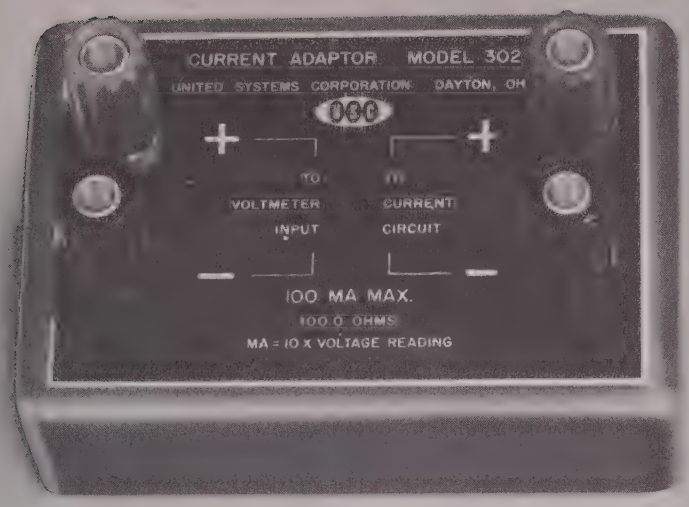
MODEL NOS.	200A 210A 220A	Z-200A Z-210A Z-220A	202A 212A 222A	Z-202A Z-212A Z-222A	Z-204A Z-214A Z-224A	Z-400A Z-410A Z-420A	
COMP. REF. NO.	COMPONENT VALUES AND/OR STOCK NOS. (000-000)						
C1 & C2 Capacitor	.0015 MFD 600V (200-006)	.0015 MFD 600V (200-006)	.0015 MFD 600V (200-006)	.0015 MFD 600V (200-006)	.0015 MFD 600V (200-006)	N/A	
C3, C4, C5 & C6 Capacitor	.05 MFD 50V (200-007)	.05 MFD 50V (200-007)	.05 MFD 50V (200-007)	.05 MFD 50V (200-007)	.05 MFD 50V (200-007)	.05 MFD 50V (200-007)	
C25 Capacitor	N/A	.05 MFD 600V (200-014	N/A	.05 MFD 600V (200-014)	.05 MFD 600V (200-014	.05 MFD 600V (200-014)	
C31 & C32 Capacitor	N/A	25 MFD 50V (200-078)	N/A	25 MFD 50V (200-078)	25 MFD 50V (200-078)	25 MFD 50V (200-078)	
C33 Capacitor	N/A	N/A	N/A	N/A	N/A	1 MFD 200V (200-079)	
C34 Capacitor	N/A	N/A	N/A	N/A	N/A	.02 MFD 50V (200-008)	
C35 & C36 Capacitor	N/A	25 MFD 25V (200-009)	N/A	25 MFD 25V (200-009)	25 MFD 25V (200-009)	25 MFD 25V (200-009)	
D5 Varistor	(200-019)	(200-019)	(200-019)	(200-019)	(200-019)	N/A	
D7 Diode	N/A	IN 2069 (200-018)	N/A	IN 2069 (200-018)	IN 2069 (200-018)	IN 2069 (200-018)	
E1 Reference Cell	(200-021)	N/A	(200-021) (2 Req'd)	N/A	N/A	N/A	
L2 Lamp	NE2H (200-025)	NE2H (200-025)	NE2H (200-025)	NE2H (200-025)	NE2H (200-025)	NE2H (200-025)	
M1 Motor only with Coupling	(200-026)	(200-026)	(200-026)	(200-026)	(200-026)	(200-026)	
M1-R10 Motor-Cntr-Pot-Assy.	(200-074)	(200-074)	(200-075)	(200-075)	(200-076)	(200-077)	
R1 Resistor, Precision	2210 Ohm, 1/2 W (200-028)	2210 Ohm, 1/2 W (200-028)	2210 Ohm, 1/2 W (200-028)	2210 Ohm, 1/2 W (200-028)	2210 Ohm, 1/2 W (200-028)	N/A	
R2 Resistor, Precision	20K Ohm, 1/2 W (200-029)	20K Ohm, 1/2W (200-029)	20K Ohm, 1/2 W (200-029)	20K Ohm, 1/2 W (200-029)	20K Ohm, 1/2 W (200-029)	N/A	
R3 Resistor Precision	200K Ohm, 1/2 W (200-030)	200K Ohm, 1/2 W (200-030)	200K Ohm, 1/2 W (200-030)	200K Ohm, 1/2 W (200-030)	200K Ohm, 1/2 W (200-030)	N/A	
R4 Resistor Precision	1M Ohm, 1/2 W (200-031)	1M Ohm, 1/2 W (200-031)	1M Ohm, 1/2 W (200-031)	1M Ohm, 1/2 W (200-031)	1M Ohm, 1/2 W (200-031)	N/A	
R5 Resistor	180K Ohm, 1 W (200-032)	180K Ohm, 1 W (200-032)	180K Ohm, 1 W (200-032)	180K Ohm, 1 W (200-032)	180K Ohm, 1 W (200-032)	N/A	
R6, R7, R8 & R9 Resistor	120K Ohm, 1/2 W (200-033)	120K Ohm, 1/2 W (200-033)	120K Ohm, 1/2 W (200-033)	120K Ohm, 1/2 W (200-033)	120K Ohm, 1/2 W (200-033)	N/A	

R10 Precision Potentiometer	(200-034)	(200-034)	(200-034)	(200-034)	(200-034)	(200-034)	
R11 Resistor	47 Ohm, 1/2 W (200-035)	220 Ohm, 1 W (200-054)	47 Ohm, 1/2 W (200-035)	220 Ohm, 1 W (200-054)	220 Ohm, 1 W (200-054)	220 Ohm, 1 W (200-054)	
R12 Potentiometer	200 Ohm, 2 W (200-036)	200 Ohm, 2 W (200-036)	200 Ohm, 2 W (200-036)	200 Ohm, 2 W (200-036)	200 Ohm, 2 W (200-036)	200 Ohm, 2 W (200-036)	
R13 Resistor	10K Ohm, 1/2 W (200-037)	4.7K Ohm, 5 W (200-080)	10K Ohm, 1/2 W (200-037)	4.7K Ohm, 5 W (200-080)	4.7K Ohm, 5 W (200-080)	4.7K Ohm, 5 W (200-080)	
R14 Potentiometer	150 Ohm, 2 W (200-038)	1500 Ohm, 2 W (200-081)	300 Ohm, 2 W (200-082)	800 Ohm, 2 W (200-083)	500 Ohm, 2 W (200-084)	1500 Ohm, 2 W (200-081)	
R15 Resistor	2370 Ohm, 5 W (200-085)	35K Ohm, 5 W (200-086)	2370 Ohm, 5 W (200-085)	15.3K ohm, 5 W (200-087)	5.3K Ohm, 5 W (200-088)	35K Ohm, 5 W (200-086)	
R43 Resistor, Precision	1.02M, 1/2 W (200-056)	1.02M, 1/2 W (200-056)	1.02M, 1/2 W (200-056)	1.02M, 1/2 W (200-056)	1.02M, 1/2 W (200-056)	N/A	
R44 Potentiometer	5K Ohm, 1 W (200-057)	5K Ohm, 1 W (200-057)	5K Ohm, 1 W (200-057)	5K Ohm, 1 W (200-057)	5K Ohm, 1 W (200-057)	N/A	
R45 Potentiometer	500 Ohm, 1 W (200-058)	500 Ohm, 1 W (200-058)	500 Ohm, 1 W (200-058)	500 Ohm, 1 W (200-058)	500 Ohm, 1 W (200-058)	N/A	
R46 Potentiometer	50 Ohm, 1 W (200-059)	50 Ohm, 1 W (200-059)	50 Ohm, 1 W (200-059)	50 Ohm, 1 W (200-059)	50 Ohm, 1 W (200-059)	N/A	
R50 Resistor	N/A	N/A	N/A	N/A	N/A	440 Ohm, W. W. (200-089)	
R52 Potentiometer	N/A	150 Ohm, 2 W (200-038)	N/A	150 Ohm, 2 W (200-038)	150 Ohm, 2 W (200-038)	150 Ohm, 2 W (200-038)	
R55 Resistor	N/A	390 Ohm, 1 W (200-090)	N/A	390 Ohm, 1 W (200-090)	390 Ohm, 1 W (200-090)	390 Ohm, 1 W (200-090)	
R56 & R57 Resistor	N/A	560 Ohm, 1 W (200-091)	N/A	560 Ohm, 1 W (200-091)	560 Ohm, 1 W (200-091)	560 Ohm, 1 W (200-091)	
R58 Resistor	N/A	N/A	N/A	N/A	N/A	68K Ohm, 1/2 W (200-052)	
R59 Resistor	N/A	N/A	N/A	N/A	N/A	47K Ohm, 1/2 W (200-092)	
R60 Resistor	N/A	N/A	N/A	N/A	N/A	33K Ohm, 1/2 W (200-041)	
SW1 Slide & Range Sw.Assy.	(200-060)	(200-060)	(200-060)	(200-060)	(200-060)	N/A	
SW3 Switch (Push to Zero)	N/A	N/A	N/A	N/A	N/A	(200-073)	
Z1 Zener Ref. Assy.	N/A	(200-093)	N/A	(200-093)	(200-093)	(200-093)	

PARTS LIST

(ALL MODELS)

REFERENCE	DESCRIPTION	STOCK NO.
C 7	Capacitor, .05 mfd, 50V	200-007
C 8	Capacitor, 25 mfd, 25 V	200-009
C 9	Capacitor, 100 mfd, 3 V	200-010
C 10	Capacitor, 10 mfd, 25 V	200-011
C 11	Capacitor, 100 mfd, 3 V	200-010
C 12	Capacitor, 25 mfd, 25 V	200-009
C 13	Capacitor, 25 mfd, 25 V	200-009
C 15	Capacitor, .02 mfd, 50 V	200-008
C 16	Capacitor, 25 mfd, 25 V	200-009
C 17	Capacitor, 25 mfd, 25 V	200-009
C 18	Capacitor, 100 mfd, 3 V	200-010
C 19	Capacitor, 100 mfd, 25 V	200-012
C 20	Capacitor, 10 mfd, 25 V	200-011
C 21	Capacitor, 10 mfd, 25 V	200-011
C 22	Capacitor, 50 mfd, 25 V	200-013
C 23	Capacitor, 50 mfd, 25 V	200-013
C 24	Capacitor, .05 mfd, 600 V	200-014
CD 1	Cord, 3 Wire Power w/Strain Relief Bushing (Portable Models)	200-015
CD 1	Polarized "Twist Lock" Receptacle (Panel and Flange Models)	200-016
CH 1	Chopper	200-017
D 1	Diode, IN 2069	200-018
D 2	Diode, IN 2069	200-018
D 3	Diode, IN 2069	200-018
D 4	Diode, IN 2069	200-018
D 6	Zener Diode, IN 714	200-020
F 1	Fuse, Bussman AGX 1.0 Amp. 250 V	200-022
J 1	Jack, Reading Retention	200-023
L 1	Lamp, #1815	200-024
R 16	Resistor, 470K ohm, 1/2 W,	200-040
R 17	Resistor, 120K ohm, 1/2 W,	200-033
R 18	Resistor, 33K ohm, 1/2 W,	200-041
R 19	Resistor, 12K ohm, 1/2 W	200-042
R 20	Resistor, 33K ohm, 1/2 W	200-041
R 21	Resistor, 22K ohm, 1/2 W	200-043
R 22	Resistor, 100K ohm, 1/2 W	200-044
R 23	Resistor, 10K ohm, 1/2 W	200-046
R 24	Resistor, 1K ohm, 1/2 W	200-047
R 25	Resistor, 4700 ohm, 1/2 W	200-048
R 26	Resistor, 3.3K ohm, 1/2 W	200-049
R 27	Resistor, 4700 ohm, 1/2 W	200-048
R 28	Resistor, 100K ohm, 1/2 W	200-044
R 29	Resistor, 200 ohm, 1/2 W	200-050
R 30	Resistor, 3.3K ohm, 1/2 W	200-049
R 31	Potentiometer, 5 ohm, 2 W	200-051
R 32	Resistor, 1K ohm, 1/2 W	200-047
R 33	Resistor, 100K ohm, 1/2 W	200-044
R 34	Resistor, 3.9K ohm, 1/2 W	200-053
R 35	Resistor, 220 ohm, 1 W	200-054
R 36	Resistor, 220 ohm, 1 W	200-054
R 37	Resistor, 68 ohm, 1/2 W	200-055
SW 2	Switch, Polarity	200-061
T 1	Transformer, Power	200-063
TR 1	Transistor, TS 604	200-064
TR 2	Transistor, TS 604	200-064
TR 3	Transistor, TS 604	200-064
TR 4	Transistor, TS 604	200-064
TR 5	Transistor, TS 604	200-064
TR 6	Transistor, 2N376	200-065
	Ground Link	200-066
	Handle	200-067
	Knob, Handle Retaining w/Friction Washer	200-068
	Knob Polarity	200-069
	Knob, Range	200-069
	Knob, Zero	200-070
	Lens, Magnifier	200-071
	Rubber Feet	200-072
	Terminal, Black Input	200-002
	Terminal, Red Input	200-004
	Terminal, Green Input	200-005



complete set of 5—$125 or $29.00 ea.

series 300—current adaptor

for use with DIGITEC d.c. voltmeter

GENERAL. The Series 300 Current Adaptors are precision shunts with voltage drop connections accurately located. They are specifically designed for use with the DigiTec Series of Digital Voltmeters, but can be used with any suitable voltmeter.

MODELS. Five models are available, arranged in decade steps as follows:

Model No.	Ohms	Current	
		For 1 Volt Drop	For 2 Volts Drop
300	10 K	100 μA	200 μA
301	1 K	1 MA	2 MA
302	100	10 MA	20 MA
303	10	100 MA	200 MA
304	1	1 AMP	2 AMP

Models 300 thru 303 can be operated at higher ΔE and correspondingly higher current. (See Dwg. 21201.) Model 304 is limited to 2 AMP.

ACCURACY. The Current Adaptors have a shunt resistance value (corrected for the impedance of the DigiTec meter) accurate to ± .05%.

COMPOSITE ACCURACY. The inaccuracy of the meter used must be added to the ± .05% inaccuracy of the current adaptor to determine the possible inaccuracy of the current measured. To reduce composite error, it is best to operate as near full scale reading of the voltmeter range as possible.

VOLTAGE DROP. Current measurement with low associated voltage drop is generally desirable, particularly for electronic circuits. The Series 400 DigiTec's provide a full scale reading of 100.0 MV and a minimum reading of 0.1 MV. Thus, accurate and resolute readings of current can be made with very low ΔE. If higher ΔE can be tolerated, the Series 200 Digitec's provide the same accurate resolute current readings.

MAXIMUM CURRENT. The Model 304 will operate continuously at **2 AMP.** Momentary overloads of **2.5 AMP** for periods of 10 seconds or less will not damage the adaptor.

The remaining Models (300 thru 303) will withstand current overloads of 50% above listed maximum values for periods of 1 minute or less.

MINIMUM CURRENT READING INCREMENT. Significant and easily read increments of **0.01** μA can be measured with a "400" DigiTec (.1 μA with a "200" DigiTec) and a Model 300 Current Adaptor.

MARKING. All Current Adaptors are marked so as to clearly distinguish between the "Thru Circuit" and the "Voltage Drop" connections.

The "Maximum Current," "Effective Resistance in Ohms" and "Conversion factor between current and voltage reading" are also well marked.

CONNECTIONS. 5-way Binding Posts on the Current Adaptor are the same as used on the DigiTec.

DIGITEC VOLTMETERS. The various models of Current Adaptors and DigiTec Voltmeters make it possible to select current readings, presentation and installation suited to specific requirements. (See Bulletin DVM-1.)
Meters with full scale readings of 100.0 MV, and 1.000, 2.000, 4.000 and 10.00 Volts are best suited for current readings.

The dual DVM—"D-210" being 2 DigiTec's mounted in one panel is well suited for simultaneous reading of voltage and current.

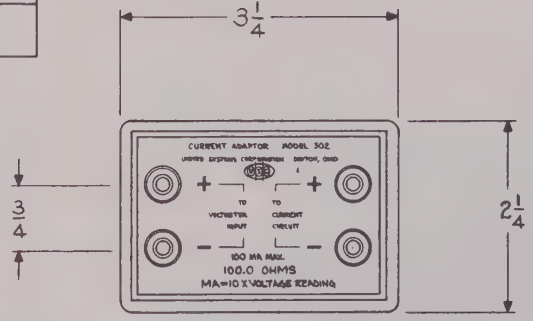
Special meters can also be furnished with internal shunts and with a front panel marked and the decimal point located so that direct reading of current is presented without any conversion factor.

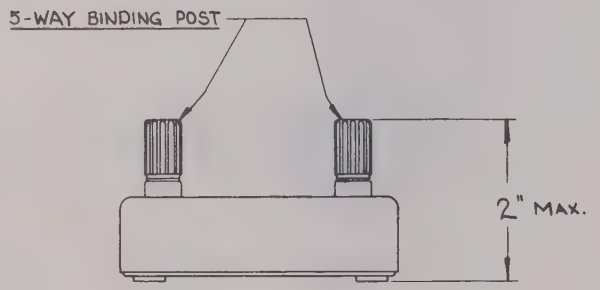
FOR ADDITIONAL INFORMATION, WRITE, WIRE OR CALL COLLECT

UNITED SYSTEMS CORPORATION
918 WOODLEY ROAD / 254-3567 / DAYTON 3, OHIO

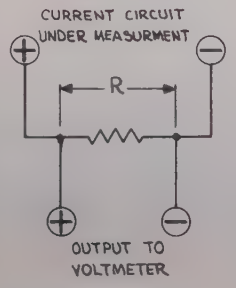
LET.	CHANGE	DATE	C. N. No.
A	REVISED	8-18-62	
B	" FOR '400'	12-12-62	

MODEL NO.	MAX. CURRENT	EFFECTIVE * SHUNT RESISTANCE "R" (±.05%)	READING FACTOR	MIN. READING INCREMENT WITH SERIES '200' DIGITEC	MIN. READING INCREMENT WITH SERIES '400' DIGITEC
300	300μA	10,000 OHMS	μA=100×VOLTAGE READING	.1 μA	.01 μA
301	10 MA	1000. OHMS	MA=VOLTAGE READING	.001 MA	.0001 MA
302	100 MA	100.0 OHMS	MA=10×VOLTAGE READING	.01 MA	.001 MA
303	300 MA	10.00 OHMS	MA=100×VOLTAGE READING	0.1 MA	.01 MA
304	2 AMP.	1.000 OHM	AMP.=VOLTAGE READING	1 MA	.1 MA





C-21201



* WHEN USED WITH DIGITEC DVM

WEIGHT- 1/4 LB.

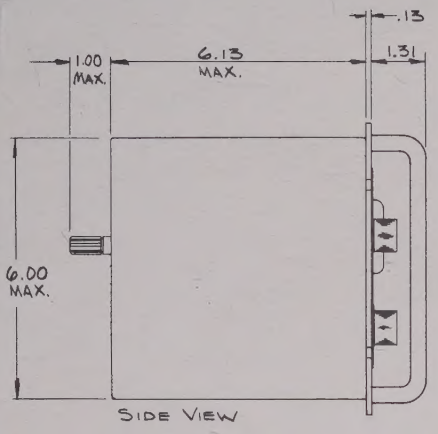
LIMITS ON DIM. UNLESS OTHERWISE SPECIFIED FRACTIONS ± DECIMALS ± ANGLES ±	DIF	BF				
MATERIAL	5-31-62		FULL			
HEAT TREATMENT	DRAFTSMAN	ENGINEER	SCALE	No. REQ.	USED ON	NEXT ASS'Y
HARDNESS	UNITED SYSTEMS CORP. DAYTON, OHIO		CURRENT ADAPTOR		C-21201	
COATING						
MACHINE √ FINISH UNLESS OTHERWISE SPECIFIED						

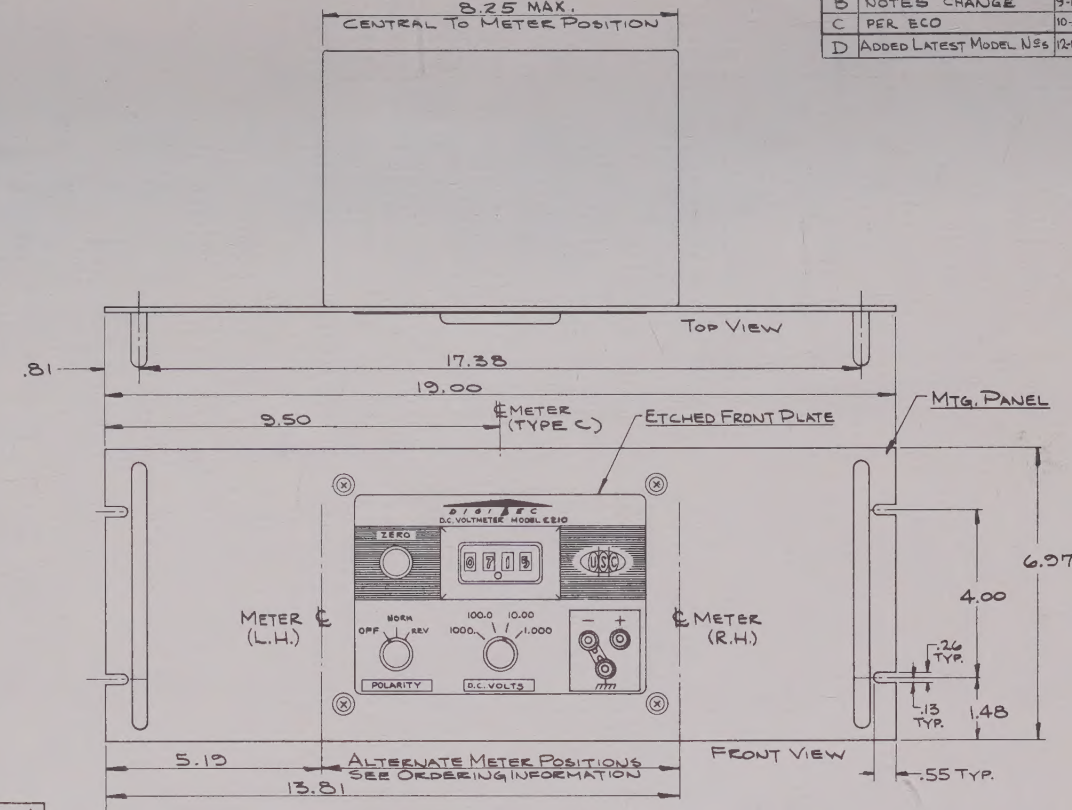
REMOVE BURRS AND BREAK SHARP EDGES .010 - .015 X 45° UNLESS OTHERWISE SPECIFIED.

SERVICE BLUE PRINT—DAYTON—CLEARPRINT NO. 1005-H

LET.	CHANGE	DATE	C. N. No.
A	REVISED	7-19-62	
B	NOTES CHANGE	9-19-62	
C	PER ECO	10-29-62	1083
D	ADDED LATEST MODEL Nos	12-12-62	

*OUTLINE DIM'S SHOWN APPLY TO MODEL NOS. { 210, 212, 214, 410





C-21301

ORDERING INFORMATION* (PANEL TYPES)	
TYPE	DESCRIPTION
C	1 METER MOUNTED IN CENTER OF PANEL
R	1 METER MOUNTED IN R.H. POSITION (13.81 DIM.)
L	1 METER MOUNTED IN L.H. POSITION (5.19 DIM.)
D	2 METERS MOUNTED IN R.H. & L.H. POSITIONS

*PANEL TYPE DESIGNATIONS MUST BE PREFIXED TO MODEL Nº OF METER(S) DESIRED TO COMPLETE ORDERING Nº.

*MODEL *C210 SHOWN

MAX. WEIGHT	
SINGLE UNIT	9 LB.
DOUBLE UNIT	16 LB.

SEE DIGITEC BULLETINS FOR SPECIFICATIONS AND ORDERING INFORMATION

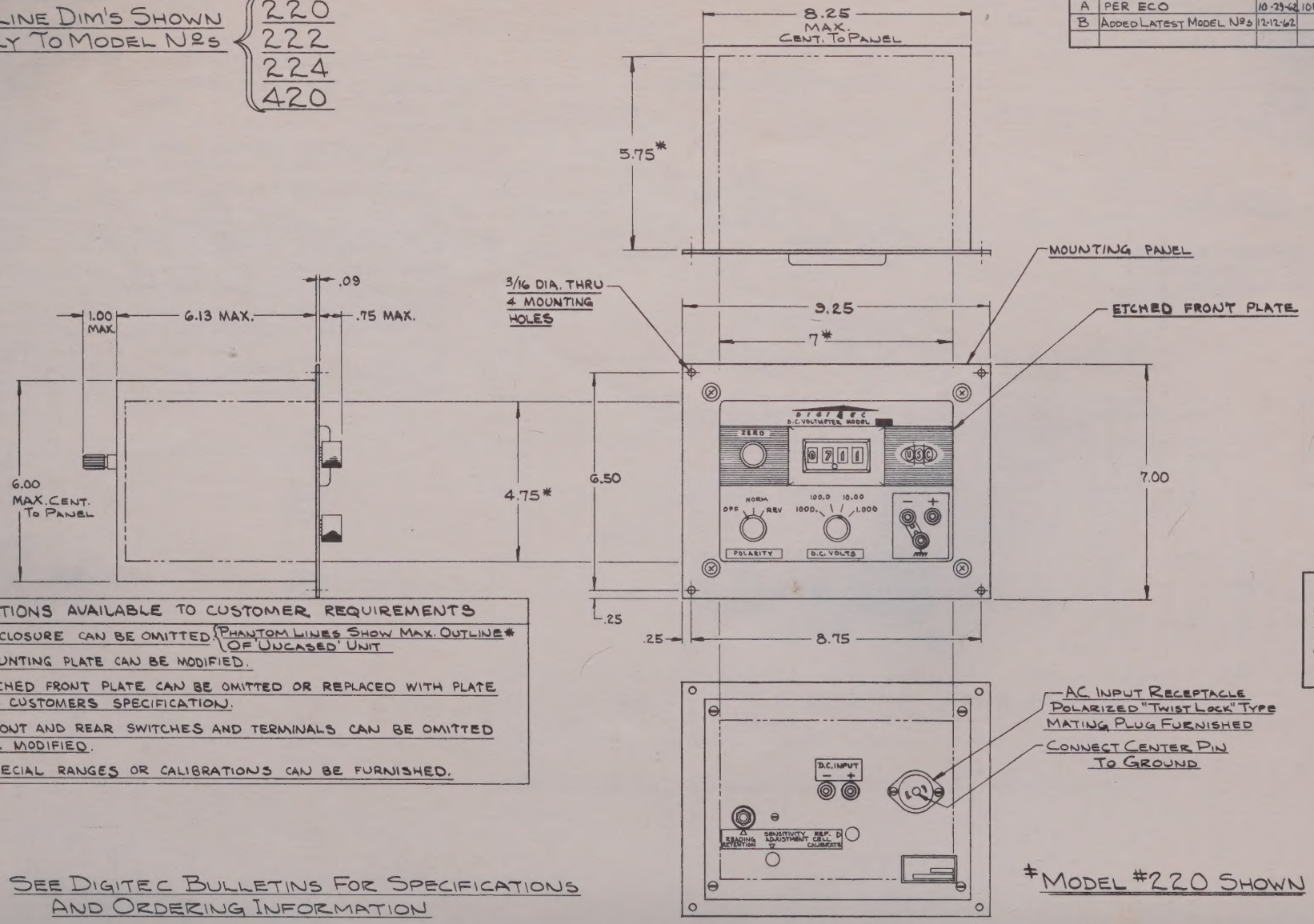
LIMITS ON DIM. UNLESS OTHERWISE SPECIFIED FRACTIONS ± - DECIMALS ± - ANGLES ± -	5/8/62						
MATERIAL	J.L.C.	B.F.	1/2 X				21300
HEAT TREATMENT	DRAFTSMAN	ENGINEER	SCALE	No. REQ.	USED ON		NEXT ASS'Y
HARDNESS	UNITED SYSTEMS CORP. DAYTON, OHIO		'DIGITEC' PANEL MOUNT OUTLINE			C-21301	
COATING							
MACHINE √ FINISH UNLESS OTHERWISE SPECIFIED							

REMOVE BURRS AND BREAK SHARP EDGES .010 - .015 X 45° UNLESS OTHERWISE SPECIFIED.

SERVICE BLUE PRINT—DAYTON—CLEARPRINT No. 1000-H

LET.	CHANGE	DATE	C. N. No.
A	PER ECO	10-29-62	1087
B	ADDED LATEST MODEL Nos	12-12-62	

OUTLINE DIM'S SHOWN APPLY TO MODEL Nos { 220, 222, 224, 420



C-21601

VARIATIONS AVAILABLE TO CUSTOMER REQUIREMENTS

1. ENCLOSURE CAN BE OMITTED. {PHANTOM LINES SHOW MAX. OUTLINE* OF 'UNCASED' UNIT
2. MOUNTING PLATE CAN BE MODIFIED.
3. ETCHED FRONT PLATE CAN BE OMITTED OR REPLACED WITH PLATE TO CUSTOMERS SPECIFICATION.
4. FRONT AND REAR SWITCHES AND TERMINALS CAN BE OMITTED OR MODIFIED.
5. SPECIAL RANGES OR CALIBRATIONS CAN BE FURNISHED.

SEE DIGITEC BULLETINS FOR SPECIFICATIONS AND ORDERING INFORMATION

*MODEL #220 SHOWN

WEIGHT-8 LB. MAX.

LIMITS ON DIM. UNLESS OTHERWISE SPECIFIED FRACTIONS ± DECIMALS ± ANGLES ±	DIF	BF				
MATERIAL	10-9-62		1/2 X			21600
HEAT TREATMENT	DRAFTSMAN	ENGINEER	SCALE	No. REQ.	USED ON	NEXT ASS'Y
HARDNESS	UNITED SYSTEMS CORP. DAYTON, OHIO		'DIGITEC' FLANGE MOUNT OUTLINE		C-21601	
COATING						
MACHINE √ FINISH UNLESS OTHERWISE SPECIFIED						

REMOVE BURRS AND BREAK SHARP EDGES .010 - .015 X 45° UNLESS OTHERWISE SPECIFIED.

SERVICE BLUE PRINT—DAYTON—CLEARPRINT NO. 1000-H

GUARANTEE

UNITED SYSTEMS CORPORATION guarantees this instrument to be free from defects in material and workmanship. This Guarantee is limited to servicing or adjusting an instrument returned to the factory for that purpose, and to repairing, replacing or adjusting all parts (except lamps, fuses and batteries) which shall, within one year after making delivery to the original purchaser, be returned by the original purchaser with transportation charges prepaid, provided the attached registration card is completed and returned to our factory, and which upon our examination shall disclose to our satisfaction to have been thus defective. If the fault has been caused by misuse or abnormal conditions of operation, repairs will be billed at a nominal cost. In this case, an estimate will be submitted before work is started.

If any fault develops, the following steps should be taken.

1. Notify USC, giving full details of the difficulty, the Model and Serial number. On receipt of this information, service data or shipping instructions will be forwarded to you.

2. On receipt of the shipping instructions, forward the instrument prepaid, and repairs will be made at the factory. An estimate of the charges will be made before the work begins, provided the instrument is not covered by the Guarantee.

SHIPPING.

All shipments of United Systems Corporation instruments should be made **via Railway Express prepaid.** The instrument should be shipped in the original packing carton; or if it is not available, any suitable container that is rigid. If a substitute container is used, the instrument should be wrapped in paper and surrounded with at least four inches of excelsior or similar shock - absorbing material.

CLAIM FOR DAMAGE IN SHIPMENT.

The instrument should be thoroughly inspected immediately upon receipt. All material in the container should be checked against the enclosed packing list. USC will not be responsible for shortages against the packing sheet unless notified immediately. If the instrument fails to operate properly, or is damaged in any way, a claim should be filed with the carrier. A full report of the damage should be obtained by the Claim agent, and this report should be forwarded to USC. Upon receipt of this report you will be advised of the disposition of the equipment for repair or replacement. Include the **Model** and **Serial number** when referring to this instrument for any reason.

UNITED SYSTEMS CORPORATION, 918 Woodley Road, Dayton 3, Ohio

DIGIEC

DIGITAL DC VOLTMETER

INSTRUCTION MANUAL
I-400A

For Models

200A	210A	220A
202A	212A	222A
204A	214A	224A
400A	410A	414A

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